Problems Statement

Acceleration of global warming due to carbon-cycle feedbacks in a coupled climate model

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The continued increase in the atmospheric concentration of carbon dioxide due to anthropogenic emissions is predicted to lead to significant changes in climate[1]. About half of the current emissions are being absorbed by the ocean and by land ecosystems[2], but this absorption is sensitive to climate[3, 4] as well as to atmospheric carbon dioxide concentrations[5], creating a feedback loop. General circulation models have generally excluded the feedback between climate and the biosphere, using static vegetation distributions and CO_2 concentrations from simple carbon-cycle models that do not include climate change[6]. Here we present results from a fully coupled, three-dimensional carbon–climate model, indicating that carbon-cycle feedbacks could significantly accelerate climate change over the twenty-first century. We find that under a 'business as usual' scenario, the terrestrial biosphere acts as an overall carbon sink until about 2050, but turns into a source thereafter. By 2100, the ocean uptake rate of 5 Gt C yr^{-1} is balanced by the terrestrial carbon source, and atmospheric CO_2 concentrations are 250 p.p.m.v. higher in our fully coupled simulation than in uncoupled carbon models[2], resulting in a global-mean warming of 5.5 K, as compared to 4 K without the carbon-cycle feedback.

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The temperature dependence of soil organic matter decomposition, and the effect of global warming on soil organic C storage

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Abstract

One of the key questions in climate change research relates to the future dynamics of the large amount of C that is currently stored in soil organic matter. Will the amount of C in this pool increase or decrease with global warming? The future trend in amounts of soil organic C will depend on the relative temperature sensitivities of net primary productivity and soil organic matter decomposition rate. Equations for the temperature dependence of net primary productivity have been widely used, but the temperature dependence of decomposition rate is less clear. The literature was surveyed to obtain the temperature dependencies of soil respiration and N dynamics reported in different studies. Only laboratory-based measurements were used to avoid confounding effects with differences in litter input rates, litter quality, soil moisture or other environmental factors. A considerable range of values has been reported, with the greatest relative sensitivity of decomposition processes to temperature having been observed at low temperatures. A relationship fitted to the literature data indicated that the rate of decomposition increases with temperature at 0°C with a Q_{10} of almost 8. The temperature sensitivity of organic matter decomposition decreases with increasing temperature, indicated by the Q_{10} decreasing with temperature to be about 4.5 at 10°C and 2.5 at 20°C. At low temperatures, the temperature sensitivity of decomposition was consequently much greater than the temperature sensitivity of net primary productivity, whereas the temperature sensitivities became more similar at higher temperatures. The much higher temperature sensitivity of decomposition than for net primary productivity has important implications for the store of soil organic C in the soil. The data suggest that a 1°C increase in temperature could ultimately lead to a loss of over 10% of soil organic C in regions of the world with an annual mean temperature of 5°C, whereas the same temperature increase would lead to a loss of only 3% of soil organic C for a soil at 30°C. These differences are even greater in absolute amounts as cooler soils contain greater amounts of soil organic C. This analysis supports the conclusion of previous studies which

indicated that soil organic C contents may decrease greatly with global warming and thereby provide a positive feed-back in the global C cycle.

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Articles

Beyond Global Warming: Ecology and Global Change

Peter M. Vitousek

While ecologists involved in management or policy often are advised to learn to deal with uncertainty, there are a number of components of global environmental change of which we are certain–certain that they are going on, and certain that they are human—caused. Some of these are largely ecological changes, and all have important ecological consequences. Three of the well—documented global changes are: increasing concentrations of carbon dioxide in the atmosphere; alterations in the biogeochemistry of the global nitrogen cycle; and ongoing land use/land cover change. Human activity–now primarily fossil fuel combustion– has increased carbon dioxide concentrations from °280 to 355 mL/L since 1800; the increase is unique, at least in the past 160 000 yr, and several lines of evidence demonstrate unequivocally that it is human—caused. This increase is likely to have climatic consequences–and certainly it has direct effects on biota in all Earth's terrestrial ecosystems. The global nitrogen cycle has been altered by human activity to such an extent that more nitrogen is fixed annually by humanity (primarily for nitrogen fertilizer, also by legume crops and as a by product of fossil fuel combustion) than by all natural pathways combined. This added nitrogen alters the chemistry of the atmosphere and of aquatic ecosystems, contributes to eutrophiction of the biosphere, and has substantial regional effects on biological diversity in the most affected areas. Finally, human land use/land cover change has transformed one—their to one—half of Earth's ice—free surface. This in and of itself probably represents the most important component of global change now and will for some decades to come; it has profound effects on biological diversity on land and on ecosystems downwind and downstream of affected areas. Overall, any clear dichotomy between pristine ecosystems and human—altered areas that may have existed in the past has vanished, and ecological research should account for this reality. These three and other equally certain components of global environmental change are the primary causes of anticipated changes in climate, and of ongoing losses of biological diversity. They are caused in turn by the extraordinary growth in size and resource use of the human population. On a broad scale, there is little uncertainty about any of these components of change or their causes. However, much of the public believes the causes–even the existence–of global change to be uncertain and contentious topics. By speaking out effectively, we can help to shift the focus of public discussion towards what can and should be done about global environmental change.

Earthquack

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Affiliation:	Yokohama
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Abstract

IN the one hundred and seventy-first volume of the ``Konrui Shinko-Kushi,'' one of the oldest and finest works on Ancient Japan, there are tables giving the number, intensity, and remarkable characteristics of all the earthquakes which occurred in Japan between the years 416 and 886 A.D. Unfortunately, the few extant copies of this most important compilation are all more or less in a fragmentary condition. It is, however, evident from the context that the author intended to, or actually did, enumerate many more of these natural phenomena, and it is highly probable that many of his original notes have been lost with the rest; but even as it stands the work is of undoubted importance, now that the Seismological Society of Japan has been doing all in its power to bring forth the ancient records which refer to the great earthquakes of the past. As every one knows, Japan is the very hearth of earthquakes; in 1854 more than 60,000 people lost their lives in consequence of one of these great terrestrial catastrophes, and it has been calculated that from ten to twelve earthquakes, each lasting several seconds, occur every year, besides numerous others of too slight a nature to be worthy of remark.

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Ecological aspects of solid waste disposal

An overview on solid waste and hazardous waste in Japan

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Abstract

There are not enough accurate data on the discharge and disposal of industrial solid waste in Japan, but an estimate is possible. This estimate shows that further recovery and recycling of resources is possible. The classification and disposal of hazardous waste is not satisfactory in Japan. On the other hand, many efforts are described for the substitution, reduction, recovery, recycling, separation, treatment and disposal of solid waste. All purpose technical solutions, such as a large scale landfill and a region-wide sewerage system, are not feasible in Japan, where smaller systems are necessary. Because industrial structure is changing rapidly, it is difficult to estimate further trends, but generally the change is in the direction of less resource consumption and less waste discharge, with more de-centralised handling of the waste. On the other hand, new types of industrial waste are being produced which present a great challenge for Japanese industry.

William Spence, Stuart A. Sipkin, and George L. Choy
Earthquakes and Volcanoes
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Earthquakes range broadly in size. A rock-burst in an Idaho silver mine may involve the fracture of 1 meter of rock; the 1965 Rat Island earthquake in the Aleutian arc involved a 650 kilometer length of the Earth's crust. Earthquakes can be even smaller and even larger. If an earthquake is felt or causes perceptible surface damage, then its intensity of shaking can be subjectively estimated. But many large earthquakes occur in oceanic areas or at great focal depths and are either simply not felt or their felt pattern does not really indicate their true size.

Today, state of the art seismic systems transmit data from the seismograph via telephone line and satellite directly to a central digital computer. A preliminary location, depth-of-focus, and magnitude can now be obtained within minutes of the onset of an earthquake. The only limiting factor is how long the seismic waves take to travel from the epicenter to the stations - usually less than 10 minutes.

Objective

- To promote a better living environment
  - to have a clean and healthy environment for every citizen in that country
- To increase the standard of living
  - increase the education level of the entire citizen, and moral awareness
- To reduce wastage
  - to save up unused energy and preserve the energy for our kids
- To ensure next generation lives in secured
  - to remain the condition of the earth in best so they can enjoy the life as we do

Project Schedule

Dates	Number of Week	Task to Finish
14-20 JUNE	Week 7	Discussing about writing proposal
21-27 June	Week 8	Hand in proposal
28 JUNE- 4 JULY	Week 9	Search on internet for relevant info
5-11 JULY	Week 10	Start typing in Microsoft Word format
12-18 JULY	Week 11	Finalizing and editing the project
19-25 JULY	Week 12	Prepare presentation of final project
26-31 JULY	Week 13	Submit of final report

Global Warming

Wastage

Earthquakes